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Cavity Perturbation Technique: The Effects of Crystal Size on the EPR Spectra of Fe8[1] MUHANDIS SHIDDIQ, Dept. of Physics and NHMFL, Florida State University, Tallahassee, FL 32310-3706, USA, JUNJIE LIU, CHRISTOPHER BEEDLE, NHMFL, Florida State University, Tallahassee, FL 32310-3706, USA, STEPHEN HILL, Dept. of Physics and NHMFL, Florida State University, Tallahassee, FL 32310-3706, USA — The Cavity Perturbation Technique (CPT) is a contact-free technique that measures the change of the characteristics of a cavity resonator upon the introduction of a foreign body (the sample under investigation). In this experiment, we study the effect of crystal size with regards to the CPT transmission spectra for single crystals of the single-molecule magnet Fe8. We have found that the frequency shift and transmission suppression become larger when the size of the sample is increased, suggesting a classical coupling between the Fe8 crystal and the resonator. From cavity perturbation theory, these phenomena may be explained by the following classical formula: $\Delta\omega/\omega = -\beta\chi$, where ω is the complex frequency, β is the filling factor that depends on the sample volume and the resonant mode of the cavity, and χ is the complex susceptibility.

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